

Flare 8 Root Cause and Corrective Action Analysis Report – NSPS Ja
February 12, 2021 through February 13, 2021

In accordance with Title 40, Part 60, Subpart Ja, provided below is information related to the discharge to the No. 8 Flare in excess of 500 lbs in a 24-hour period in accordance with §60.103a(c) and the recordkeeping and reporting requirements of 40 C.F.R. §60.108a(c)(6). This report also includes information required under the Consent Decree entered in United States, et al. v. HOVENSA, LLC, Civ. No. 1:11-cv-0006.

a. A description of the discharge [40 CFR §108a(c)(6)(i)]

During the time period of non-compliance covered by this report, there were three events that contributed to high SO₂ emissions from the flare.

1. *On February 11, 2021, Operations identified a leak in the fin-fan condensers at the No. 5 Amine Regeneration Unit (5ARU). During the duration of the SO₂ exceedance event, 5ARU was slowly depressured to No 8 flare to ready the unit to repair the leak.*
2. *On February 12, 2021, No. 9 Gas turbine tripped causing a load shed in Complexes 1 and 2. The load shed caused the Gas Recovery Unit (GRU) compressor to trip (Complex 1). When the GRU compressors are down, the Low-Pressure Fuel Gas Amine contactor off-gas vents to flare.*

b. The date and time the discharge was first identified and the duration of the discharge [40 CFR §60.108a(c)(6)(ii)] & [Consent Decree Paragraph 60.a]

The discharge was first identified on February 12, at 1:00 hours and lasted until February 13, 2021 at 20:59 hours.

c. The measured or calculated cumulative quantity of gas discharged over the discharge duration. Include measured H₂S, Total sulfur, SO₂, and flow rate as applicable. [40 CFR §60.108a(c)(6)(iii)-(vii)] and calculations used to determine the quantity of SO₂ that was emitted. [Consent Decree Paragraph 60.b]

Appendix 1 to this document includes the data recorded by the data acquisition and handling system related to the continuous monitoring system located at Flare 8. SO₂ emissions are calculated using the total reduced sulfur quantity measured by analyzer in the flare header, the total flow to the flare, and a 99% conversion of total sulfur to SO₂ per 40 CFR §60.108a(c)(6)(vii.)

d. The steps taken to limit the emissions during the discharge and the duration of the discharge. [40 CFR §60.108a(c)(6)(viii)] and [Consent Decree Paragraph 60.c]

When the leak was identified, Operations followed the unit's shutdown procedures which includes depressuring to the No. 8 flare in preparation for maintenance.

When GT-9 tripped, Operations immediately worked on bringing GT-10 and a GRU compressor online.

The duration of the event was 44 hours as described in “b” and “c” above.

- e. The root cause analysis and corrective action analysis including an identification of the affected facility, the date and duration of the discharge, a statement noting whether the discharge resulted from the same root cause(s) identified in a previous analysis and either a description of the recommended corrective action(s) or an explanation of why corrective action is not necessary. [40 CFR §60.108a(c)(6)(ix)] and [Consent Decree Paragraph 60.d]
1. *H₂S and other sulfur species were released to Flare 8 from the 5ARU and the GRU Low-Pressure Fuel Gas Amine contactor.*
 2. *The release occurred from Flare 8, an affected facility under NSPS, Subpart Ja.*
 3. *The duration of the event was 44 hours as described in “b” and “c” above.*
 4. *The root cause analysis:*

Root Cause Analysis	Corrective Action Analysis (or explanation that no corrective is necessary)	Status: completed within 45 days or schedule with proposed implementation and completion dates
Leak in the fin-fan condensers at the No. 5 Amine Regeneration Unit (5ARU) prompted Operations to slowly depressure 5ARU to the No 8 flare in preparation for maintenance work	<ul style="list-style-type: none"> • Operations shut down No 5 Amine Regeneration unit and started up No 4 Amine Regeneration (4ARU) unit to take its place. • 5ARU was isolated from the clean acid gas header feeding the sulfur plant. • Operations followed the unit's shutdown procedures 	<p>Completed within 45 days</p> <p>Completed within 45 days</p> <p>Completed within 45 days</p>
GRU compressor tripped due to GT-9 tripping and causing load shed in Complexes 1 & 2	<ul style="list-style-type: none"> • Bring GT-10 online to prevent further load shedding • Restart GRU compressor operation 	<p>Completed within 45 days</p> <p>Completed within 45 days</p>

- f. An analysis of the measures, if any, that are available to reduce the likelihood of a recurrence of the discharge resulting from the same root cause or significant contributing causes in the future. The analysis shall discuss all reasonable alternatives, if any, that are available, the probable effectiveness and cost of the alternatives, and whether an outside consultant should be retained to assist in the analysis. Possible design, operation and maintenance changes shall be evaluated. [Consent Decree Paragraph 60.e]

See response to “e” above. No further analysis was performed.

- g. For Acid Gas Flaring Incidents (not Hydrocarbon Flaring Incidents), specifically identify each of the grounds for stipulated penalties in paragraphs 63, 64 and 65 and describe whether the Incident falls under any of those grounds. [Consent Decree Paragraph 60.f]

This flaring event was determined to be an Acid Gas Flaring Incident. This acid gas flaring event is not a result of any of the root causes identified in paragraphs 63 and 64. The root cause of the acid gas flaring event was not a recurrence of the same root cause that resulted in previous acid gas flaring. As such, the provisions of paragraph 65.a.ii apply. Corrective actions were implemented as noted in Section (e) and therefore, stipulated penalties do not apply.

- h. For any corrective action analysis for which corrective actions are required, a description of the corrective action(s) completed within the first 45 days following the discharge and, for action(s) not already completed, a schedule for implementation, including proposed commencement and completion dates. [40 CFR §60.108a(c)(6)(x)] and [Consent Decree Paragraph 60.h for supplement report]

See response to "e" above.

- i. If the analysis determines that corrective action is not required, the report shall explain the basis for that conclusion. [Consent Decree Paragraph 60.e]

See response to "e" above.

- j. For each discharge from a flare that is the result of a planned startup or shutdown of a refinery process unit or ancillary equipment connected to the flare, a statement that a root cause analysis and corrective action analysis are not necessary because the owner or operator followed the flare management plan. [40 CFR §60.108a(c)(6)(xi)]

Not applicable.

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Appendix 1 - DAHS Records

Flare 8 Report

Plant: LIMETREE BAY REFINERY

Report Period: 02/11/2021 00:00 Through 02/13/2021 23:59

Source		FLARE08				
Parameter (Unit)		H2SPPMD (PPM) 001H	H2SPPMD (PPM) 003H	TRSPPM (PPM) 001H	SO2LBS (LBS) 001H	SO2LBS (LBS) 024H
02/11/21	00:00	86.5	125.8	127.9	7.2	348.2
02/11/21	01:00	111.1	114.7	151.6	8.5	343.6
02/11/21	02:00	128.5	108.7	167.8	11.3	343.6
02/11/21	03:00	136.4	125.4	175.5	13.5	347.4
02/11/21	04:00	141.2	135.4	179.5	13.7	349.8
02/11/21	05:00	115.5 C	131.1	155.9 C	11.8	353.9
02/11/21	06:00	105.1 C	120.6	146.5 C	11.8	359.5
02/11/21	07:00	93.8	104.8	135.2	9.9	361.5
02/11/21	08:00	99.3	99.4	143.2	10.3	342.7
02/11/21	09:00	103.4	98.8	151.7	12.1	331.2
02/11/21	10:00	102.9	101.9	154.1	11.7	325.1
02/11/21	11:00	131.2	112.5	183.1	14.0	326.9
02/11/21	12:00	149.2	127.8	197.6	15.1	322.2
02/11/21	13:00	174.8	151.7	226.8	17.3	321.6
02/11/21	14:00	176.8	167.0 E	228.5	16.5	319.2
02/11/21	15:00	228.0	193.2 E	271.8	19.6	317.6
02/11/21	16:00	311.0	238.6 E	345.1	25.2	325.6
02/11/21	17:00	305.4	281.4 E	349.5	29.2	336.5
02/11/21	18:00	217.8	278.0 E	259.2	16.1	335.6
02/11/21	19:00	253.7	259.0 E	288.0	18.1	349.5
02/11/21	20:00	154.4	208.6 E	206.8	14.0	347.8
02/11/21	21:00	675.2	361.1 E	706.6	45.9	380.2
02/11/21	22:00	837.0	555.5 E	856.1	59.5	426.4
02/11/21	23:00	708.2	740.1 E	726.2	51.1	463.5
02/12/21	00:00	564.2	703.1 E	583.7	42.2	498.5

F = Unit Offline E = Exceedance C = Calibration S = Substituted U - Startup
 I = Invalid M = Maintenance T = Out Of Control * = Suspect D - Shutdown

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Source		FLARE08					
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02/12/21	01:00	452.2	574.9 E	475.7	34.4	524.5 E	
02/12/21	02:00	485.9	500.8 E	507.1	37.3	550.5 E	
02/12/21	03:00	486.0	474.7 E	506.1	39.2	576.2 E	
02/12/21	04:00	500.5	490.8 E	518.3	39.7	602.2 E	
02/12/21	05:00	523.8 C	503.5 E	541.3 C	42.3	632.7 E	
02/12/21	06:00	261.7 C	428.7 E	288.5 C	24.7	645.6 E	
02/12/21	07:00	1,358.0	714.5 E	1,332.7	112.8	748.5 E	
02/12/21	08:00	478.9	699.5 E	492.9	42.9	781.1 E	
02/12/21	09:00	259.3	698.7 E	284.3	24.7	793.7 E	
02/12/21	10:00	254.3	330.8 E	283.7	25.3	807.3 E	
02/12/21	11:00	262.1	258.5 E	293.9	25.8	819.1 E	
02/12/21	12:00	292.9	269.7 E	322.3	28.1	832.1 E	
02/12/21	13:00	282.7	279.2 E	310.7	26.9	841.7 E	
02/12/21	14:00	392.3	322.6 E	419.4	35.9	861.0 E	
02/12/21	15:00	318.6	331.2 E	354.5	30.8	872.2 E	
02/12/21	16:00	2,689.8	1,133.6 E	2,594.3	229.8	1,076.9 E	
02/12/21	17:00	293.3	1,100.6 E	336.2	31.0	1,078.7 E	
02/12/21	18:00	534.9	1,172.7 E	551.9	47.4	1,110.0 E	
02/12/21	19:00	782.4	536.9 E	782.3	60.9	1,152.9 E	
02/12/21	20:00	658.4	658.6 E	685.6	55.6	1,194.4 E	
02/12/21	21:00	14,522.1	5,320.9 E	13,847.0	953.7	2,102.1 E	
02/12/21	22:00	1,791.1	5,657.2 E	1,757.0	125.3	2,167.9 E	
02/12/21	23:00	692.0	5,668.4 E	714.7	51.5	2,168.3 E	
02/13/21	00:00	393.2	958.8 E	426.4	32.0	2,158.1 E	
02/13/21	01:00	277.9	454.4 E	308.3	23.1	2,146.8 E	

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E = Exceedance

M = Maintenance

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U - Startup

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02/13/21	02:00	209.4	293.5 E	236.6	17.8	2,127.3 E
02/13/21	03:00	131.6	206.3 E	157.5	11.9	2,100.0 E
02/13/21	04:00	132.5	157.8	157.6	11.7	2,071.9 E
02/13/21	05:00	113.4 C	125.9	142.0 C	10.2	2,039.8 E
02/13/21	06:00	103.0 C	116.3	140.4 C	10.2	2,025.3 E
02/13/21	07:00	85.3	100.6	125.9	9.2	1,921.6 E
02/13/21	08:00	73.2	87.2	121.5	8.9	1,887.6 E
02/13/21	09:00	123.1	93.9	183.7	13.4	1,876.4 E
02/13/21	10:00	131.3	109.2	203.6	14.2	1,865.3 E
02/13/21	11:00	97.2	117.2	177.3	15.4	1,854.9 E
02/13/21	12:00	62.1	96.9	132.4	11.7	1,838.5 E
02/13/21	13:00	47.1	68.8	94.4	9.4	1,821.0 E
02/13/21	14:00	48.0	52.4	97.1	9.2	1,794.4 E
02/13/21	15:00	48.0	47.7	95.6	9.9	1,773.5 E
02/13/21	16:00	59.1	51.7	104.9	10.2	1,553.8 E
02/13/21	17:00	43.8	50.3	82.7	8.2	1,531.0 E
02/13/21	18:00	38.6	47.2	77.9	7.5	1,491.1 E
02/13/21	19:00	83.8	55.4	123.1	11.5	1,441.7 E
02/13/21	20:00	42.0	54.8	78.5	7.6	1,393.8 E
02/13/21	21:00	39.8	55.2	74.5	7.3	447.4
02/13/21	22:00	41.5	41.1	76.3	7.4	329.4
02/13/21	23:00	40.8	40.7	75.0	7.3	285.2

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